

**Catalogue Description:**

This is a continuation of Microstructural Interpretation but includes application to non-ferrous metals, ceramic and polymeric systems. Experiments are performed in heat treating, casting, working, and mechanical property evaluation of materials. Evaluation and interpretation of the materials are incorporated. Laboratory experiments are performed requiring engineering reports. Laboratory safety is emphasized.

**Credits:** 1.0 Credit (Lecture & Lab)

**Designation:** Required course (Metallurgical and Materials Engineering, General Engineering- Welding Option)

**Prerequisites:** EMAT 351 or EMAT 353 or permission of the instructor.

**Textbook:** None, lab précis will be provided.

**References:** As per lab précis.

**Relationship of Course to Metallurgical and Materials Engineering Program Outcomes:**

This course provides practical experience in the fundamental themes of materials science and engineering.

**Objectives:** The objective of this course is to provide the student with:

- 1) Practical experience with the processing, microstructure and performance of materials, and
- 2) Practical experience with the relationships between them.

**Outcomes:** Graduates of the course will be experienced in technical report writing, in which the graduates will have related their familiarity with:

- 1) Relate material behavior to mechanisms at an atomic/microstructure level,
- 2) Performance measures in materials testing,
- 3) Common microstructures encountered in non-ferrous alloys,
- 4) The effect of heat treatments on microstructures of non-ferrous alloys, and
- 5) Fulfill **ABET** outcomes **6 & 9** (Consult the course catalogue and Department Guidelines)

**Requirements:**

1. **Talking with other students or sleeping in class or having ear phones during lecturing is prohibited and is considered disruptive behavior.**

## Tentative Laboratory Plan

<u>Date</u>	<u>Planned Activity/Experiments</u>
Week 1	Safety demonstration/sign-up
Week 2	Martin Luther King Day
Week 3	Expt.1: Aluminum Casting
Week 4	Expt.1: Aluminum Casting
Week 5	Expt.2: Aluminum Precipitation Strengthening
Week 6	Expt.2: Aluminum Precipitation Strengthening ( <i>Lab Rpt.#1 due</i> )
Week 7	Presidents Day
Week 8	Expt.3: Fractography ( <i>Lab Rpt.#2 due</i> )
Week 9	Expt.4: Stainless Steel Welds
Week 10	Spring break
Week 11	<i>Spare (Lab Rpt.#3 due)</i>
Week 12	Expt.5: Cold Work and Annealing ( <i>Lab Rpt.#4 due</i> )
Week 13	Expt.5: Cold Work and Annealing
Week 14	Expt.5: Cold Work and Annealing
Week 15	<i>Spare</i>
Week 16	Final class/lab meeting - ( <i>Lab Rpt.#5 due</i> )

### **Expectations:**

1) Attend the lab, and let me know in case you need to be elsewhere prior to any class.

2) **Note that all reports must be satisfactorily completed before a grade is assigned.** *You will lose 1 point per day for late submission for unexcused reasons.*

### **Assessment:**

The assessment will be an average of the ALL the required lab reports submitted PLUS *attendance, and active participation in the lecture class and labs.*

### **Grading:**

A = (92-100), A- = (90-91.9), B+ = (88-89.9), B = (82-87.9), B- = (80-81.9), C+ = (78-79.9), C = (72-77.9), C- = (70-71.9), D+ = (68-69.9), D = (62-67.9), D- = (60-61.9), F = (0-59.9)

### **Contribution to Professional Component:**

Engineering Topics - Yes  
Engineering Design - No  
Computer Usage - Yes – spreadsheets, word processor  
Ethics - No  
Statistics - No  
Safety - Yes

### **ABET outcomes covered: 6 & 9**

- (6) Design and conduct experiments, analyze and interpret data
- (9) To integrate the understanding of the scientific and engineering principles underlying the four major elements of the field: structure, properties, processing, and performance related to material systems appropriate to the field

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